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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/956,986      | 09/21/2001  | Michiharu Matsui     | 214258US2S          | 2952             |

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EXAMINER

TRAN, THIEN F

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 12/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

|  |                                      |                                      |
|--|--------------------------------------|--------------------------------------|
| <b>Offic Action Summary</b>  | <b>Application No.</b><br>09/956,986 | <b>Applicant(s)</b><br>MATSUI ET AL. |
|  | <b>Examiner</b><br>Thien F Tran      | <b>Art Unit</b><br>2811              |
| <i>-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --</i>   |                                      |                                      |
| <b>Period for Reply</b>  |                                      |                                      |
| <b>A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.</b>   |                                      |                                      |
| - Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.<br>- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.<br>- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.<br>- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).<br>- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b). |                                      |                                      |
| <b>Status</b>  |                                      |                                      |
| 1) <input type="checkbox"/> Responsive to communication(s) filed on ____.<br>2a) <input type="checkbox"/> This action is <b>FINAL</b> .                    2b) <input checked="" type="checkbox"/> This action is non-final.<br>3) <input type="checkbox"/> Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under <i>Ex parte Quayle</i> , 1935 C.D. 11, 453 O.G. 213.  |                                      |                                      |
| <b>Disposition of Claims</b>   |                                      |                                      |
| 4) <input checked="" type="checkbox"/> Claim(s) <u>1-60</u> is/are pending in the application.<br>4a) Of the above claim(s) <u>2,4,6,8-10,12,13,15-31,33,35 and 37-60</u> is/are withdrawn from consideration.<br>5) <input type="checkbox"/> Claim(s) ____ is/are allowed.<br>6) <input checked="" type="checkbox"/> Claim(s) <u>1,3,5,7,11,14,32,34 and 36</u> is/are rejected.<br>7) <input type="checkbox"/> Claim(s) ____ is/are objected to.<br>8) <input type="checkbox"/> Claim(s) ____ are subject to restriction and/or election requirement.  |                                      |                                      |
| <b>Application Papers</b>  |                                      |                                      |
| 9) <input type="checkbox"/> The specification is objected to by the Examiner.<br>10) <input type="checkbox"/> The drawing(s) filed on ____ is/are: a) <input type="checkbox"/> accepted or b) <input type="checkbox"/> objected to by the Examiner.<br>Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).<br>11) <input type="checkbox"/> The proposed drawing correction filed on ____ is: a) <input type="checkbox"/> approved b) <input type="checkbox"/> disapproved by the Examiner.<br>If approved, corrected drawings are required in reply to this Office action.<br>12) <input type="checkbox"/> The oath or declaration is objected to by the Examiner.   |                                      |                                      |
| <b>Priority under 35 U.S.C. §§ 119 and 120</b>   |                                      |                                      |
| 13) <input checked="" type="checkbox"/> Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).<br>a) <input checked="" type="checkbox"/> All    b) <input type="checkbox"/> Some * c) <input type="checkbox"/> None of:<br>1. <input checked="" type="checkbox"/> Certified copies of the priority documents have been received.<br>2. <input type="checkbox"/> Certified copies of the priority documents have been received in Application No. ____.<br>3. <input type="checkbox"/> Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).<br>* See the attached detailed Office action for a list of the certified copies not received.  |                                      |                                      |
| 14) <input type="checkbox"/> Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).<br>a) <input type="checkbox"/> The translation of the foreign language provisional application has been received.  |                                      |                                      |
| 15) <input type="checkbox"/> Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.  |                                      |                                      |
| <b>Attachment(s)</b>   |                                      |                                      |
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)<br>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)<br>3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>5,7,9,11</u> .                    4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____.<br>5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)<br>6) <input type="checkbox"/> Other: ____.  |                                      |                                      |

**DETAILED ACTION*****Election/Restrictions***

Applicant's election of claims 1, 3, 5, 7, 11, 14, 32, 34 and 36 in Paper No. 10 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

***Drawings***

Figures 46A-46B, 47A-47B, 48A-48B and 49A-49B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Claim Objections***

Claim 1 is objected to because of the following informalities: line 6, "layer" should be --film--. Appropriate correction is required.

Claim 5 is objected to because of the following informalities: line 8, "layer" should be --film--. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 5, 7, 11, 14, 34 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (APA) in view of Tomioka et al. (USPN 5,793,081).

Admitted prior art discloses a semiconductor device (Figs. 48A-49B) comprising a semiconductor layer 11; a first insulating film 12 formed on said semiconductor layer; a first electrode layer 13 formed on said first insulating film; an element isolating region 15 comprising an element isolating insulating film formed to extend through said first electrode layer and said first insulating film to reach an inner region of said semiconductor layer, said element isolating region isolating an element region and being self-aligned with said first electrode layer; a second insulating film 16 formed on said first electrode layer and said element isolating region; and a second electrode layer 18 formed on said second insulating film and said first electrode layer. APA does not disclose the second insulating film 16 of ONO (oxide-nitride-oxide) formed on the first electrode layer in the selective gate region and an open portion exposing a surface of said first electrode layer being formed in said second insulating film so that said second electrode layer being electrically connected to said first electrode layer via said open portion. Tomioka et al. discloses a semiconductor device (Figs. 1A, 1B) comprising a second insulating film 6 of ONO formed on a first electrode layer 12a in the selective gate region and an open portion 6' exposing a surface of said first electrode layer being formed in said second insulating film so that a second electrode layer 12b formed on the second insulating film being electrically connected to said first electrode layer via said open portion. It would have been obvious to a person having ordinary skill in the art at

the time the invention was made to form the second insulating film 16 of ONO on the first electrode layer in the selective gate region of APA having an open portion exposing a surface of said first electrode layer being formed in said second insulating film so that said second electrode layer 18 being electrically connected to said first electrode layer 13 via said open portion as taught by Tomioka et al. as the conditions for etching of the composite gate on the memory cell transistor side and the gate electrode on the selective transistor side become almost equal to each other, therefore, there is an advantage that the workability thereof is improved.

Regarding claim 3, said first and second electrodes comprise a gate electrode of a selective transistor included in a NAND type flash memory.

Regarding claim 5, APA further discloses a semiconductor device in a memory cell array region comprising said semiconductor layer 11; said first insulating film 12 formed on said semiconductor layer; said first electrode layer 13 formed on said first insulating film; said element isolating region 15 comprising an element isolating insulating film formed to extend through said first electrode layer and said first insulating film to reach an inner region of said semiconductor layer, said element isolating region isolating an element region and being self-aligned with said first electrode layer; said second insulating film 16 formed on said first electrode layer and said element isolating region; and said second electrode layer 18 formed on said second insulating film; wherein a surface of said element isolating region of said memory cell array region is arranged below a surface of said first electrode layer.

Regarding claim 7, said first electrode layer 13 performs a function of a floating gate and said second electrode layer 18 performs a function of a control gate in said memory cell array region.

Regarding claim 11, APA also discloses a connecting member 20 arranged above said element isolating region and electrically connected to said second electrode layer 18.

Regarding claim 14, APA further discloses a wiring 21 electrically connected to said second electrode layer 18 via a connecting member 20, wherein said wiring and said first electrode layer 13 are connected to each other via said second electrode layer 18 extending from said element region onto said element isolating region.

Regarding claim 34, said second insulating film comprises of a complex insulating film including a silicon nitride film.

Regarding claim 36, the modified APA disclose a gate electrode is formed of said first and second electrode layers (13, 18), wherein said second insulating film remains at an edge portion of said gate electrode.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (APA) in view of Tomioka et al. (USPN 5,793,081) as applied to claim 1 above, and further in view of Kim et al. (USPN 5,326,999).

The combined references as described above does not explicitly disclose the first electrode layer formed of polysilicon and the second electrode layer formed of metal silicide. It is old and well known in the art to form a gate electrode comprising a first electrode layer of polysilicon and a second electrode layer of polycide (polysilicon and

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metal silicide layers) as shown for example by Kim et al. Kim et al. shows a first electrode layer 11 of polysilicon and a second electrode layer (15, 17) of polycide. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to form the first electrode layer 13 of polysilicon and the second electrode layer 18 of polycide in order to reduce gate resistance.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thien F Tran whose telephone number is (703) 308-4108. The examiner can normally be reached on 8:30AM - 5:00PM Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

tt  
November 29, 2002



Thien Tran  
Patent Examiner  
Technology Center 2800